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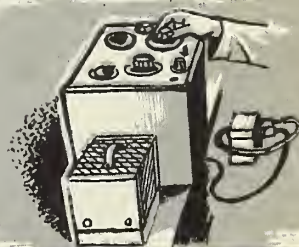
U. S. DEPARTMENT OF AGRICULTURE

IN THIS ISSUE

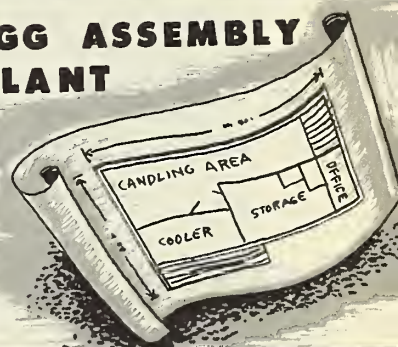
STORAGE LIFE OF LETTUCE



OIL CONTENT IN 10 MINUTES



EGG ASSEMBLY PLANT



New Methods of Handling
FROZEN FOODS
in Warehouse Plants

UNITED STATES DEPARTMENT OF AGRICULTURE

Agricultural Marketing Service

Washington, D. C.

NEW METHODS FOR HANDLING FROZEN FOODS IN WAREHOUSE PLANTS

By Theodore H. Allegri Page 3

USDA engineers developed and tested three new systems for handling frozen foods in warehouse plants. The author, who is with the Transportation and Facilities Branch of AMS, describes the methods and equipment used and how the new systems reduced handling costs in these plants.

STORAGE LIFE OF LETTUCE

By C. S. Parsons and R. C. Wright (retired). Page 8

Commercial handlers of lettuce can find some interesting facts on storing and shipping lettuce from this study which USDA made for the U. S. Navy to determine conditions for maximum storage life of lettuce. Mr. Parsons is with the Biological Sciences Branch of AMS.

MEASURING COTTONSEED OIL CONTENT IN 10 MINUTES

By Marion E. Whitten and Charles E. Holaday. Page 10

Cotton technologists of USDA developed a rapid, simple, and inexpensive method of determining the oil content of cottonseed. The instruments used in this method require no special skill to operate. Here's the story by the men who did the work.

MARKETING EGGS IN ALASKA

By John A. Hamann. Page 13

The author, a marketing specialist in the Poultry Division of AMS, was in Alaska on a Federal-State matched-fund project. He reports on some of his observations on egg marketing in the Territory.

FINGER-TIP TALLY

By Robert K. Bogardus. Page 16

EGG ASSEMBLY PLANT LAYOUT

By Robert Stoyanoff. Page 18

Here's a plant layout, designed for the medium-size assembler, that offers both immediate and long-range reductions in egg handling costs. The author is with the Transportation and Facilities Branch of AMS.

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New Methods For Handling Frozen Foods In Warehouse Plants

By Theodore H. Allegri

Wholesale distributors of frozen foods can reduce their annual handling costs 15 to 28 percent by using new methods and equipment developed by engineers of USDA's Agricultural Marketing Service and tested in 3 typical wholesale plants.

Using one of the improved systems that included a power roller conveyor, a wholesaler handling 2,000 cases a day reduced his costs by 15 percent. A single-deck cart system achieved a saving of 18 percent for a wholesaler handling over 2,000 cases a day. A multiple-deck cart system resulted in a saving of 28 percent in handling costs in a plant with a volume of 1,000 cases.



A power roller conveyor unit for assembling frozen food orders.

These results were obtained in a research project conducted by the Transportation and Facilities Branch of AMS, in cooperation with the National Wholesale Frozen Foods Distributors' Association and the three wholesalers whose handling operations were studied intensively.

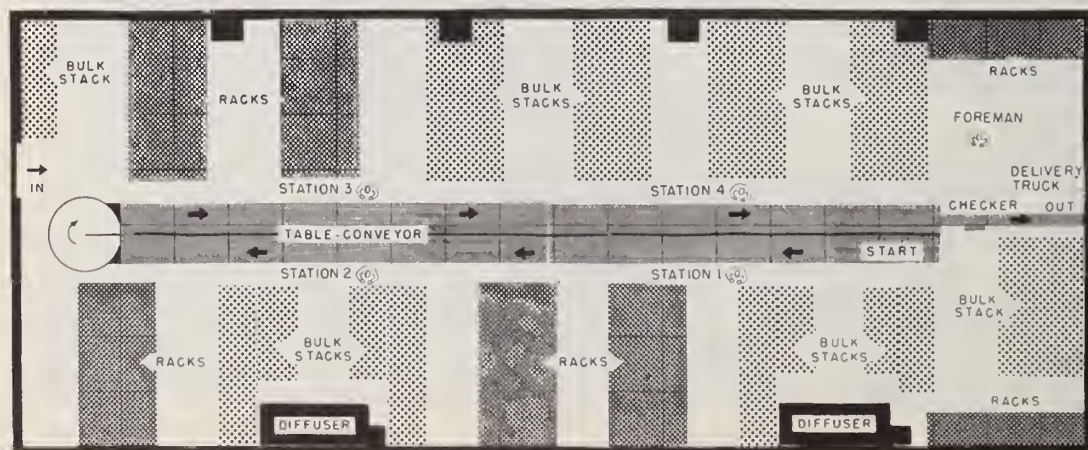
POWER ROLLER CONVEYOR ORDER ASSEMBLY

A change from a 4-wheel handtruck and roller-conveyor system to a power-conveyor and straddle-type forklift-truck operation in a plant handling a daily volume of about 2,000 cases, resulted in a saving of \$7,850 a year. This plant, located in a public refrigerated warehouse, stocks 275 different frozen food items. Using 9 delivery trucks, it assembles, loads, and delivers 350 orders a day. The new method saves 9 cents an order. This saving should enable the distributor to pay for the new equipment, which cost \$12,725, in less than 2 years.

The new equipment, constructed as a portable unit, consists of two parallel power conveyors connected at one end by a rotary-powered transfer table. For operational purposes, the connection of the two lines, which move in opposite directions, provides a single line of 150 feet rather than two separate lines of 75 feet.

Gravity-type wheel conveyors, 12 inches wide, are hinged alongside the full length of each power-conveyor line. This provides adequate working surface for splitting cases and packing less-than-case lot items. A 44-inch wide table placed 20 inches above the power conveyor provides space for stacking "broken" cases, empty cartons, and loose packages.

The power-roller conveyor is mounted on casters and installed in the center of a large room, 40 by 100 feet with a ceiling 15 feet high. But during the receiving and stocking operations, the side-hinged wheel conveyors are placed in the "down" position and the whole unit is rolled to one side of the center aisle to get greater aisle space. As part of the new system, a forklift truck and pallets were installed to replace the 4-wheel platform trucks. Side aisles of stock, spaced 6 feet 2 inches apart, were placed perpendicular to the conveyor. These provided aisle frontage for the maximum number of items and sufficient space for a forklift truck carrying a 36- by 48-inch pallet.



The conveyor line was divided into 4 order-filling stations and 1 checking station. The latter station was connected with the delivery truck by a section of gravity-type roller conveyor. This distributor was able to use a 6-man instead of an 8-man crew in this operation. (See diagram on page 4.)

SINGLE-DECK CART SYSTEM

In a plant handling over 2,000 cases daily the use of a single-deck cart system increased order-assembly productivity and saved about 65 percent of the public storage costs. With a saving of almost 8 cents an



order this distributor should be able to pay for the newly installed equipment within 2 years. Total annual savings for this distributor were about \$16,300, or 18 percent of the former method.

The wholesale plant in which this research was conducted is located in a group of interconnected 2-story buildings. The first floor of one building is used as a freezer room. There is no loading platform for the breakup room, which is at street level. The distributor's average daily volume of well over 2,000 cases is assembled into 700 to 900 orders. Individual orders average 10 items each.

One of the weaknesses of the nonpowered gravity-conveyor system, which was also used in this plant, is the excessive delay time caused by the interdependency of the workers in the order-assembly (breakup) room. The power roller conveyor system described previously overcomes this interdependency to a large extent.

The conveyor line was replaced with a cart system in which the order fillers work independently of one another. Each worker, using a single-deck cart, fills a complete order and not just part of an order as on the conveyor assembly line.

Order-Selection Cycle

An order-selection cycle begins when the worker takes an empty cart from the cart parking area located outside the breakup room. Each worker is assigned one or more invoices by the checker or crew foreman. Orders are filled in the sequence in which they are to be loaded into the delivery trucks. The dispatcher arranges the invoices into delivery sequence beforehand. Two delivery trucks are loaded simultaneously, and one man in each loading crew of two workers checks each order as it is loaded.

In order to have adequate equipment on hand at all times and thus

minimize delay time, it was necessary to provide about 35 carts. If an adequate number of carts had not been provided, order fillers would have been idle frequently because of the large number of carts continually tied up on the loading apron.

It was possible to use a 16-man crew instead of the 19-man crew that was formerly used in this operation. Thus, three men were made available for a backlog of maintenance work that was required in this plant. In addition, by enlarging the freezer room it was possible to increase the storage capacity and save a considerable amount of the public storage charges.

MULTIPLE-DECK CART SYSTEM

A small-volume plant handling 1,000 cases daily originally used a manual handling system that employed platform hand trucks and wheel conveyors. A change to a multiple-deck cart system achieved an estimated annual saving of \$6,750, or 28 percent of the cost of the former method employed by this plant. This represented a saving of 13 cents an order. Total cost of order assembly was only 34 cents an order.

Both the power roller conveyor and the single-deck cart systems work effectively for order-assembly operations when delivery trucks are available at the plant while the orders are being filled. However, these systems lose some of their effectiveness when it is necessary to assemble orders while the trucks are away from the plant making deliveries.

When orders are assembled during the day while the trucks are on their routes, it is necessary to hold the assembled orders in the freezing room. It is desirable to have a cart of greater capacity than the single-deck cart so that several orders can be assembled and placed on one cart until the delivery trucks are ready to be loaded.

The distributor stocked about 250 items and on peak days loaded-out 200 orders. A preprinted invoice sheet listing 80 of the items in stock with several blank lines was used in filling the orders in the breakup room. This type of preprinted invoice appeared to slow down the work of the order fillers. Work went faster in other case study plants in which invoices listing only the required items were printed by automatic accounting machines.



Two multiple-deck carts used for order selection: A loaded cart, and an empty cart with shelves raised.

Before this study, the plant used 2 roller

conveyor lines, each approximately 50 feet long, separated by piles of working stock in the breakup room. Packing tables were not used. Packing and case splitting were performed on the conveyors.

The multiple-deck cart is larger and not as maneuverable as the single-deck cart described. The cart is usually parked near the center of the selection area during order assembling and moved only to enable the worker to load several cases of a given item. Each order filler assembles a complete order and loads it on the proper route cart; 15 carts in all are used. The last 2 digits of the invoice number are marked on each carton.

Each cart will hold from 5 to 15 orders, depending on the size of the orders. When a cart has been loaded it is pushed to the cart parking area near the exit door to the breakup room, and an empty cart is pushed into position in the center of the working area by the worker. Orders are usually selected in radial fashion from the center of the room rather than in circular fashion as with the single-deck cart.

The multiple-deck cart system was installed in the same room used in the former operations, but it was equipped with racks for stacking pallets by forklift truck and racks for handstacking slower moving items. A few of the faster moving items were placed in palletized bulk storage areas near the entrance of the room. A small part of the room is set aside for the bulk storage of reserve stock. Additional reserve stocks are kept on top of the pallet racks.

About 75 percent of the total volume is handled with 36- by 48-inch pallets. Since the central part of the room is the center of activity in order selection, the faster moving items are stacked near the center of the room towards the entrance. The slower moving items are located farthest away from the center. As in the other case study plants, the items are stacked according to commodity type.



End-view of loaded multiple-deck carts in the parking area.

All of the aisles are 6 feet 6 inches wide. This width allows 2 carts to pass and is sufficient for the straddle-type forklift truck used in restocking. Empty carts are parked outside the breakup room on the loading dock. The new cart system permitted a crew of 5 men to do the work formerly requiring 7 men. Although there were no changes in the room-size, the efficient arrangement of the stock slightly increased the storage capacity of this room.

Storage Life Of Lettuce

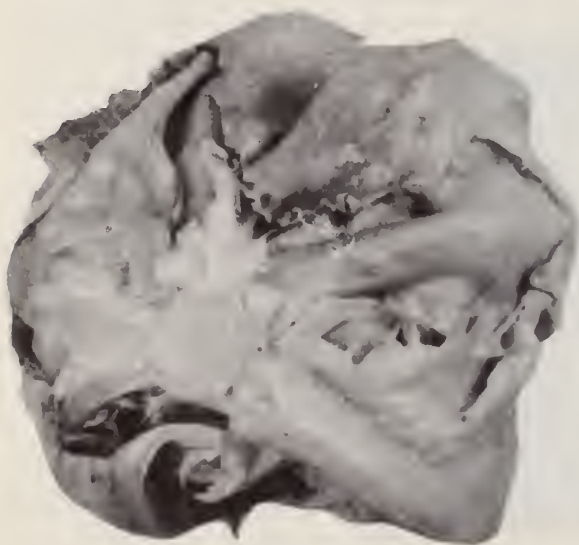
By C. S. Parsons and R. C. Wright

Lettuce keeps better, after 2 weeks, if stored at 32° F. than at 38°. Field-trimmed lettuce keeps better than untrimmed lettuce or lettuce trimmed before storing. Almost as much edible lettuce is obtained from 26 pounds of trimmed lettuce, stored for 6 weeks at 32°, as from 42 pounds of untrimmed lettuce. This saves space as well as weight. And lettuce shipped and stored in polyethylene liners remains in better condition longer than if handled in any other way.

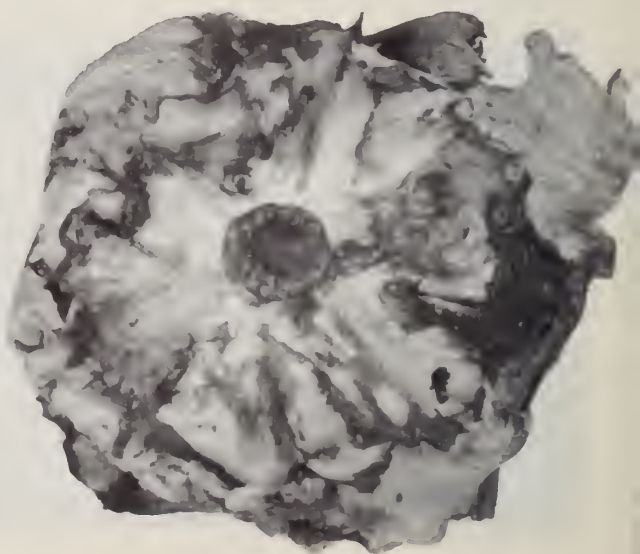
These findings were reported to the U. S. Navy as some of the more important results of a study made on lettuce by USDA's Agricultural Marketing Service. This is part of a continuing study AMS is making for the Navy on the maximum storage life of vegetables eaten raw.

In this study, cartons of trimmed and untrimmed lettuce were stored at 32° and 38° F. Navy stores lettuce at 38° or above. Relative humidity was maintained at 90 to 95 percent. After 2 weeks, cartons of trimmed lettuce were taken from storage, the heads were again trimmed to remove the inedible leaves, and the edible amount was determined.

After 2 and 4 more weeks, the same cartons were taken from storage, the heads trimmed again, and the edible amount determined. Cartons of untrimmed lettuce were removed from storage at 2, 4, and 6 weeks. The lettuce was trimmed and the amount of edible lettuce determined.



Field-trimmed lettuce stored 6 weeks at 32° F.



Untrimmed lettuce stored 6 weeks at 32° F.

Larger percentages of lettuce were edible after 6 weeks at 32° than at 38°. The average percentages of edible lettuce were about the same after 6 weeks at 32° as after 4 weeks at 38°. On the other hand, lettuce stored only 2 weeks kept about equally well at 38° as at 32°.

The green color of fresh lettuce was retained longer than 32° than at 38°. In some lots lettuce at 32° remained green for more than 6 weeks. Lettuce stored at 38° was lacking in color after only 4 weeks. Almost as much edible lettuce was obtained from storing 26 pounds of trimmed lettuce for 6 weeks at 32° as from storing 42 pounds of untrimmed lettuce. This represents a saving in space as well as in weight.

Furthermore, lettuce trimmed before storage has a better appearance. The outer leaves were often wilted, but the inner leaves were crisp and green. In contrast, a watery soft rot usually developed in the outer leaves of the untrimmed heads. This causes the inner leaves to become flabby and tan.

Field-Trimmed Lettuce Keeps Better

In general, field-trimmed lettuce kept better than untrimmed lettuce or lettuce trimmed after it got to the market. The loose, older wrapper leaves are especially susceptible to breakage and decay. Removing them in the field before packing and shipping the lettuce apparently eliminates considerable subsequent trimming and increases the percentage of edible lettuce.

Lettuce shipped and stored in polyethylene liners remained in good condition longer than lettuce handled in any other way. After a transit period of 1 week and a storage period of 6 weeks at 32°, 86 percent of the original lettuce was still edible; at 38°, 65 percent remained edible. Lettuce field trimmed and wrapped in cellophane showed a greater variability in keeping quality than the lettuce in cartons lined with polyethylene. But they both stored about equally well at 32°.

Trimmed lettuce kept about equally well in sealed and unsealed polyethylene liners and wraps. Oxygen concentration within sealed liners and wraps dropped slightly from normal, but no off-flavors or abnormal deterioration occurred in the lettuce. At higher temperatures, however, damaging concentrations of carbon dioxide or depletion of oxygen may occur in sealed containers. These conditions would seriously impair the keeping quality of stored lettuce.

Trimmed lettuce in polyethylene wraps or carton liners was better than lettuce stored in regular, unlined cartons with wrapper leaves attached. After 6 weeks at 32°, 10 to 21 percent more edible lettuce was obtained from the trimmed lots in lined cartons than from the untrimmed lot in unlined cartons.

The untrimmed lettuce in unlined cartons and with unsealed liners deteriorated more rapidly than any of the other lots tested. In sealed liners, however, the untrimmed lettuce consistently kept better at 38° than at 32°.

Measuring Cottonseed Oil Content In 10 Minutes

By Marion E. Whitten and Charles E. Holaday

A rapid, inexpensive, and simple electronic method of determining the oil content of cottonseed has been developed by cotton technologists of the U. S. Department of Agriculture. The new method obtains accurate results in 10 minutes, and the instruments used require no special skill to operate.

It takes only 7 minutes to prepare and grind a cottonseed sample by the new method. Another 3 minutes are needed to filter the sample and take a meter reading. Two operators can handle 100 samples in less than 6 hours. Expenses for materials are estimated at 16 cents a sample.

This compares with the 24 hours required to complete the present official USDA test, a chemical method of analysis in use for the last 20 years. Estimated cost per sample, for materials using the present chemical method, is about 9 cents. However, the initial cost of equipment and maintenance of it are considerably more expensive than that of the electronic method developed through marketing research.

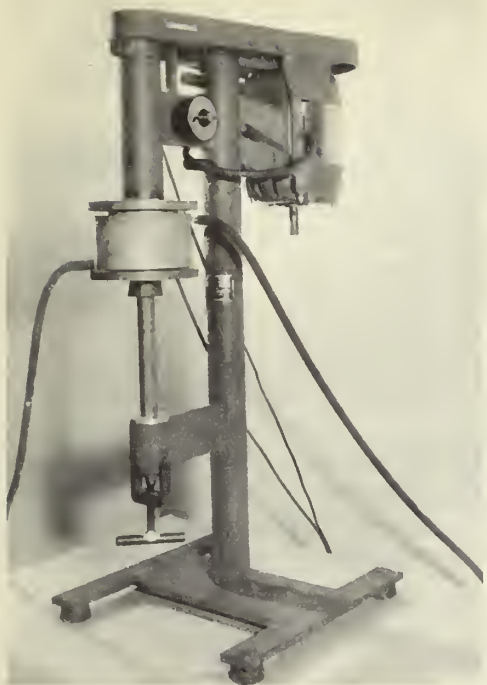
Most Important Quality Determining Factor

Oil content is the most important factor in determining the quality of cottonseed. It alone has accounted for from 43 to 60 percent of the entire value of cottonseed during the past 30 years.

Lack of a rapid method to determine the oil content of small lots in the past, has obstructed the establishment of a practical method for evaluating the quality of such lots of cottonseed. Since oil content of individual lots may vary more than 250 pounds per ton of seed, a reliable method of grading is essential for efficient marketing.



Testing a sample



Grinder-extractor

Cottonseed is purchased on official grades by oil mills in most areas of the Cotton Belt. This system is too elaborate, expensive, and time consuming for grading farmer's individual lots. Farmers usually sell to ginners at average prices without regard to quality. This marketing system involves risks for ginners as well as inequities to farmers. And it fails to provide farmers with an incentive to produce high-quality cottonseed.

Electronic Method - Sound and Practical

The electronic method, employing the dielectric principle, has proved a sound and practical method for measuring the oil content of cottonseed, particularly small lots at gins.

Technologists of the Agricultural Marketing Service who developed this new method also evaluated the official USDA, the direct evaporation, specific gravity, "salting out," refractive index, and infra-red absorption methods for determining oil content. None of these methods proved practical for use in small-lot grading.

Dielectric Principle

This is what is known as the dielectric principle: In an electrical field, a material's molecules tend to orient themselves in a definite pattern with respect to the direction of the field. The dielectric constant of a material is a measure of the degree to which the individual particles are oriented. The dielectric constant is a definite and fundamental characteristic for any substance.

In recent years, interest in electronic equipment has led to the development of several instruments useful in measuring certain dielectric properties of liquid samples. Not too long ago the Department developed dielectric methods of rapidly determining the oil content of soybeans and flaxseed. (See June 1953 and July 1952 issues of *MARKETING ACTIVITIES*. In a future issue of this publication, the technologists of the Grain Division of AMS, who developed the methods for determining oil content of soybeans and flaxseed, will report on their development of a rapid method for determining the oil content of safflower and sunflower seed.)

Electronic Method of Analysis

This is how the electronic method of analyzing cottonseed for oil content applies the dielectric principle: The operator places the cottonseed sample and the solvent (orthodichlorobenzene) in a high-speed, impact-cutter-type grinder-extractor. A complete oil extraction is ob-

tained in 5 minutes. The instrument's spindle speed is 15,000 r. p. m. and the blade tip speed is 135,000 inches per minute. It is powered through a "V" belt by a 3/4 h.p. motor. The temperature of the seed-solvent mixture is maintained at about 35° C. by a water-cooled cup.

The mixture is then placed in a hand press and an air-pressure filter to rapidly separate the liquid from the solid material. The hand press retains most of the large lint and hull particles, and the filter paper in the air-pressure filter gets the remainder. A desiccant (dryer) which is added to remove all traces of moisture from the extract also aids in filtration of the mixture.

The oil meter is essentially a substitution radio frequency capacity meter and a cell suitable for measuring liquid dielectrics. The test cell consists of two concentric metal cylinders. The inner cylinder is suspended in and electrically insulated from the outer cylinder with the space between the two forming a condensor. The liquid to be measured substitutes for the fixed condensor. The oil extract is placed in a test cell and a direct meter reading taken.

Testing the Method

In testing the method, researchers analyzed 120 samples of cottonseed for oil and moisture contents by the official USDA method. They also tested these samples for oil content by the dielectric method. The test cell temperature was not controlled, but temperature measurements were taken. An analysis of the results indicated a correlation of ± 0.986 between the two methods and a standard error of difference of ± 0.229 . The samples included several varieties of cottonseed with oil content varying from 15.5 to 21.8 percent and moisture content from 7.0 to 21.9 percent. After the test cell temperature was controlled, results of additional tests gave a correlation of ± 0.994 and a standard error of ± 0.15 .

Time and Cost

The oil content of cottonseed can be determined in 10 minutes by the electronic method. Preparation and grinding of the sample takes 7 minutes. Filtration and reading the meter takes 3 minutes. While one sample is being filtered, operators can prepare a second sample and start the grinding-extraction. If the volume warrants it, 2 operators can process 100 samples in a little less than 6 hours. One person can operate 2 grinder-extractors while the other handles the filtration and takes meter readings. In addition to labor costs, the expense of the solvent, filter paper, desiccant, and electric power is estimated at 16 cents per sample.



Air-pressure and mechanical filters

Marketing Eggs In Alaska

By John A. Hamann

When a housewife buys eggs in Alaska, she does the same thing that a housewife does in the States. She looks on the egg carton label to see what grade they are -- most of them are marked AA or A.

But retailers and wholesalers in Alaska, buying and selling eggs, use an egg quality identification all their own. They advertise and trade "Airborne," "Express," "Boat," "Canadian," and "Local" eggs. These quality terms were the natural result of merchandising efforts by the egg trade to get away from the spoiled and off-flavor eggs that were the rule rather than the exception in Alaska years ago. Consumers were in the habit of associating egg quality with the mode of transportation available at that time.

Today, air-freight service, truck service via Alcan Highway, and steamship service provide new and improved methods of transportation plus modern storage facilities. But the habit of associating egg quality with transportation still prevails in Alaska.

Egg quality at the consumer level has improved considerably with the changes in transportation and storage facilities. But too frequently very poor quality and loss eggs are found in the egg cartons with better quality eggs.

"Airborne" eggs generally originate from Washington and Oregon. They are flown from Seattle to Anchorage in approximately 6 to 8 hours. Normally, these eggs are shipped in new fiber cases containing 15 or 30 one-dozen cartons at freight rates of 14 to 17 cents a pound. Airlines provide a refrigerated holding room at the airport. Delivery truck service is also available at the airport. These eggs were retailing for about 94 cents a dozen in July of this year.

"Express" eggs are loaded in Seattle into trailers equipped with refrigerating units. The trailers are taken to the docks and hoisted aboard a barge that can haul a double-decked load of about 30 trailers. Electricity furnished by the barge powers the trailer-refrigeration units.

These eggs are maintained at 36° F. enroute to destination -- the trip from Seattle to Seward takes about 7 days. Upon arrival the trailer bodies are unloaded onto trailer-tractor units and hauled to their final destination. This method speeds up delivery time. It also eliminates 4 to 5 case handlings normally involved in boat shipments. The freight cost, including transshipping from Seward to Anchorage, is about 4 cents a pound. These eggs were retailing for about 77 cents.

Refrigeration by Sea Water

"Boat" eggs are shipped by steamship in ventilated holds. The sea water against the ship's exterior and the air supply the only refrigeration. At Seward the eggs are transported by truck or uniced refrigerator cars. The freight rate from Seattle to Seward is about the same by steamship as by express. But transshipment from Seward 470 miles to Fairbanks adds 1-1/2 cents per pound. These eggs were selling for 77 cents a dozen.

"Canadian" eggs enter Alaska in refrigerated trucks via Alcan Highway and by boat from British Columbia. These eggs sold for 73 cents a dozen on a 4th of July sale.

"Truck" eggs are eggs shipped by refrigerator trucks from the North Central States via Alcan Highway. They retail for about the same price as Canadian eggs.

"Local" eggs are produced on farms adjoining the Fairbanks, Palmer, Anchorage, and Juneau areas and sold directly to retailers. They sell for about \$1.20 to \$1.25 a dozen.

Local Egg Production

In recent years, egg production has increased in Alaska. But few producers depend entirely on their flocks as their sole source of income. The main source of local egg production comes from regularly housed laying flocks of 50 to 5,000 birds. The average size flock is about 150 to 200 birds.

Most of the poultry feed is shipped in from the States and costs about \$45 more per ton than in the United States. The high feed cost, resulting from freight rate charges, accounts for the high price of local eggs. Chicken feed shipped from Chicago through Seattle costs less in Hawaii, 4,600 miles away, than in Alaska, 3,400 miles away.

Marketing Facilities

Alaska, unlike the large egg-distributing areas of the U. S., lacks facilities for grading and packing eggs. Most eggs shipped into Alaska are already graded and packed. The little packing and grading done locally is confined to a number of large producers and a small but active marketing cooperative in the Matanuska Valley.

Eggs are generally displayed very effectively in modern refrigerated display cases in self-service supermarkets. These stores, patterned after similar markets in the States, are even present in the smaller towns.

Providing holding space for backlog stock is one of the big problems. Eggs are generally held at from 60° to 80° F. during the summer months in nonrefrigerated storage for 1 to 3 weeks, or more, in the back of the store or in the basement. A large backlog of eggs is usually maintained to guard against any shortage due to shipping interruptions in the States. Where refrigerated storage is available for backlog supplies, eggs are

frequently stored with fruits and vegetables. In these circumstances, eggs acquire off-flavors.

Proper stock rotation is another problem in Alaska. In some cases, if a "good" buy shows up in a new purchase this supply is "pushed" while older stock is kept in storage. This practice caused at least one lot of relatively high priced local eggs to set around for 3 weeks at unrefrigerated temperatures while low-priced eggs, which were offered as "leaders," were held under refrigeration in ideal sales location.

Egg Quality

Most egg shipments are marked AA large or AA extra large. These eggs originate in Washington and are shipped by air or sea. Shipments from Canada and Minnesota are marked A large and shipped by truck. Local eggs are marked either large or grade A large.

The best quality eggs were found in the few shell-treated (a colorless, tasteless mineral oil applied to the shell that aids retention of quality) airborne lots from Washington and in several local untreated lots. If stains were ignored on local eggs, they would have been of excellent quality.



A typical Alaska laying flock

Finger-Tip Tally

By Robert K. Bogardus



Wholesalers in the fresh fruit and vegetable industry can use a simple hand-operated counting machine to reduce the amount of clerical work required for loading out a truck with customer orders. This new application of an old device reduces paper work when used for "recapping" invoices and inventory control.

No cost study was made to determine the amount of savings possible by use of this method.

Wholesalers tally customers' orders to determine the total number of items needed to fill all orders. The totals, or "recaps," are used to check against current stocks. When wholesalers make the necessary purchases or adjustments, the totals are turned over to warehouse personnel. They now provide the basis for the assembly of all items. An error in the "recap" that results in an item missing from the assembly area delays the loading operation.

Companies using the counters find that they reduce time required to tally invoices and the number of errors. This is particularly true when the counter is used to replace the pencil and paper "fence post" tally (HH).

Metal and Plastic Construction

The counters are of metal and plastic construction, 1-1/2 inches square, and register up to 9999. The operator presses down the counter's top cover plate to register items. After the units have been entered the operator reads the total directly from the numbered dial. The operator sets the dial back to zero by turning the knob on the right side of the counter.

Counters Can Record More Than One Unit

Sometimes it is necessary to purchase a few counters that record more than one unit at a time. For example, in one case a counter might be set so that each time the cover was depressed ten units would be entered. A second counter would supplement this to record single units. If thirty-four 100-pound sacks of potatoes were ordered the multiple input counter would be pressed 3 times to register 30 and the other counter would be pressed 4 times to record 4. The required number of items would be obtained by adding the totals of the 2 counters.

Wholesalers need a large number of counters to tally the many different food items that they handle. They can assemble as many as 180 counters in a single bank. They set the banks up in several rows. Each row is connected so when operators turn the knob at either end all the counters in the row are zeroed.

Card Inserts Identify Counters

An individual card insert enables operators to identify each counter's item. The arrangement of these cards can be made to correspond to the order in which the items appear in the invoice. This simplifies the job of locating the proper counter. The invoices to be tallied can be set on a stand at the left of the bank of counters for easy reading. The recap sheet can be placed to the right. When the "recaps" are complete they can be totaled on the counters in the same manner to provide a grand total of all items sold. These totals are entered on a master recap or inventory control sheet.

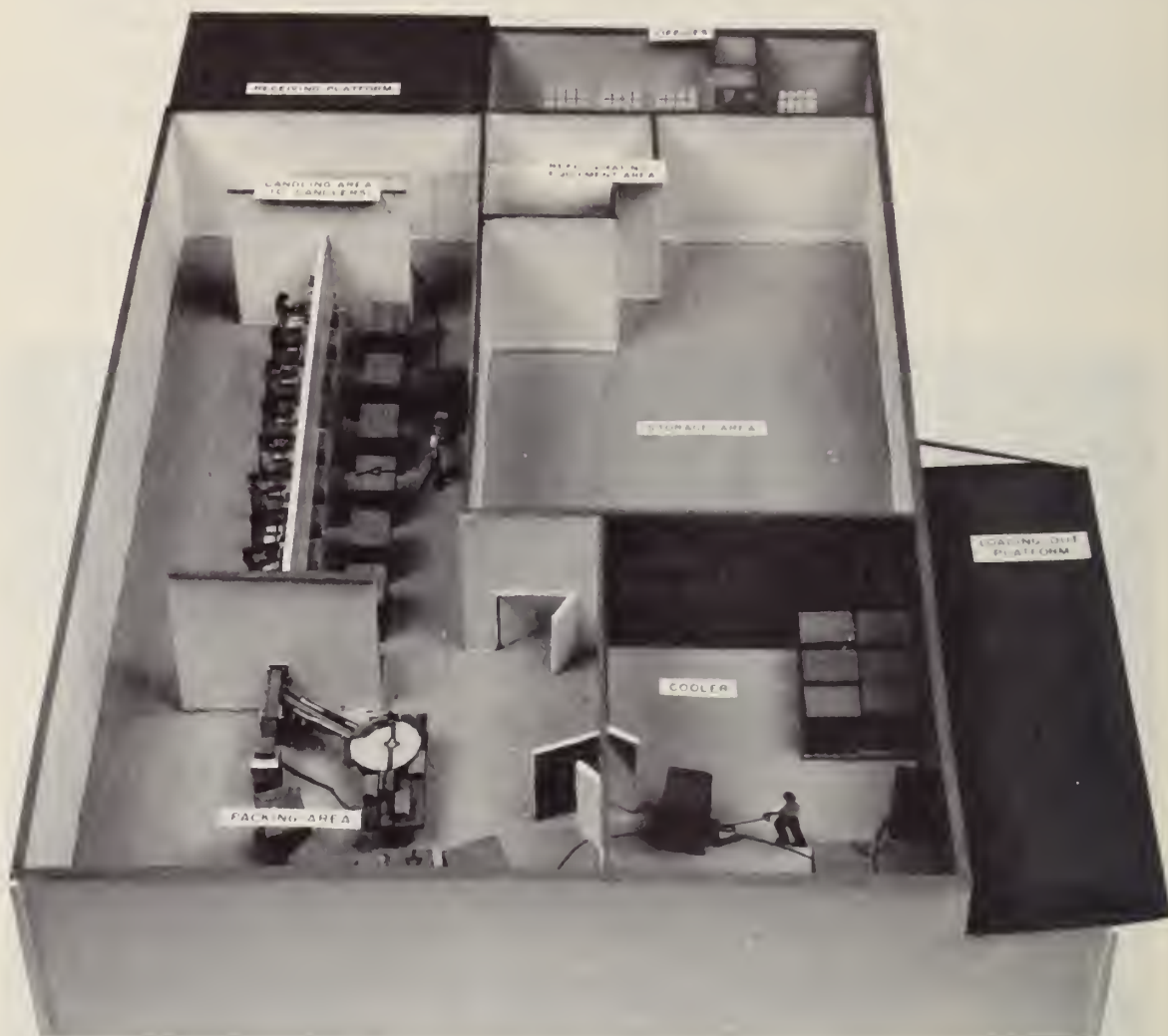
An accurate inventory record provides a guide for making economical purchases and minimizes losses due to spoilage that often occurs when some highly perishable items are ordered in excess of actual requirements.



A bank of counters

Egg Assembly Plant Layout

By Robert Stoyanoff



Here's an egg assembly plant layout, developed by U. S. Department of Agriculture specialists, that offers both immediate and long-range reductions in egg-handling costs.

The ideal layout for an egg assembly plant is seldom achieved unless a new plant is built. In most plants the problem is remodeling to improve operating efficiency and provide space for new or increased operations.

Requirements must be analyzed in terms of plant needs and possible changes in layout. They also must be flexible enough to permit an orderly expansion program.

In the suggested plant layout, designed for the medium-size assembler, an attempt is made to visualize the space requirements from a long-range point of view. In choosing a site for the initial plant layout the site itself should be of sufficient size to accomodate the plant with necessary driveways and parking areas. It also should permit progressive additions over a reasonably long period of time.

Candling Production Line

The candling production line shown in the layout is designed for cartoning operations which are becoming more prevalent in this type of plant. The same general layout without the cartoning equipment could be used just as efficiently for packing bulk eggs until such time as carton-ing operations are considered desirable.

The plant layout is designed to permit a 100-percent increase in production-line capacity by utilizing both sides of the candling bench. Additional storage space for eggs and supplies is obtained by using vertical space. By controlling inventories and planning orderly shipments, it would be possible to practically double the plant capacity by using a palletized handling method and by utilizing vertical space effectively.

If either egg-breaking or oil-treating operations are added to existing candling operations, it would be possible to expand the plant layout either on the side next to the candling production line, or at the rear of the building. Therefore, it is important to locate the plant properly on the original site to permit expansion.

Handling Equipment

The handling equipment should consist of one 2-wheel handtruck and 2 hand-operated, pallet-lift trucks. An adequate number of wooden pallets, 40 by 48 inches, will be required for stacking eggs and supplies. As vertical space is used, an electric straddle-arm forklift truck will be needed.

Air Conditioning and Refrigeration

A serious problem arises in the handling of eggs: high humidity and low temperatures required for product quality control are not considered optimum for worker comfort. An effort should be made to keep the room temperature at 68° F. during working hours and 60° overnight, with a 65-percent humidity night and day.

In order to minimize the heat load, special provisions can also be made in the plant construction. Good roofing, building insulation, window area reduction, and the use of water sprays or flooding roofs are helpful. The storage area is neither refrigerated or air-conditioned, nor are the offices air-conditioned. The candling area and cooler are

OFFICIAL BUSINESS

air-conditioned. The main refrigerating equipment is efficiently located above the rest rooms and does not interfere with the overall layout.

Construction Requirements

Unloading platforms for route-type trucks should be 45 inches high and loading-out platforms for trailer trucks should be 51 inches. A ceiling height of 14 feet will accommodate palletizing operations where stacks are two pallets high. At the same time, there is enough space to provide the necessary minimum clearance of 12 inches under trusses and steam pipes, and 18 inches under fans, heaters, lights, and sprinklers. Some candling production lines also require 12-foot ceilings for installing carton-forming equipment and supply chutes.

Floors should be constructed of concrete and properly treated. Smooth and hard floors will be easier and more economical to maintain. It also allows a rapid movement of equipment. Precautions should be taken to provide doors which are high and wide enough to accommodate equipment of various sizes.